

09/582232

Practitioner's Docket No. SAMP-US1

## IN THE UNITED STATES DESIGNATED OFFICE (DO/US)

PCT/GB99/00260	26 January 1999 (26.01.99)	28 January 1998 (28.01.98)
International Application Number	International Filing Date	International Earliest Priority Date

TITLE OF INVENTION: **SMOKING ARTICLES**

APPLICANTS FOR DO/US: British American Tobacco (Investments) Limited; SAMPSON, John Roger

**Box PCT****Assistant Commissioner for Patents****Washington, D.C. 20231****ATTENTION: DO/US****COMPLETION OF FILING REQUIREMENTS  
FOR INTERNATIONAL APPLICATION ENTERING NATIONAL  
STAGE IN U.S. DESIGNATED OFFICE (DO/US) UNDER 35 U.S.C. 371****COMPLETION OF REQUIREMENTS**

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. This is a First submission of items for a national stage filing under 35 U.S.C. 371.
2. Applicant expressly requests that national phase examination procedures begin at any time (35 U.S.C. 371(f)), rather than delay examination until the expiration of the applicable time limit set forth in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
3. A proper Demand for International Preliminary Examination was made by the 19<sup>th</sup> month from the earliest claimed priority date.
4. A copy of the International Application was transmitted by the International Bureau, along with any amendments made under PCT Article 19. A copy of PCT/GB99/00260, published as WO 99/38396 is transmitted herewith. A copy of the International Search Report is attached to WO 99/38396. A copy of a Notification of a Change in the name and address of the applicant is also attached.
5. Attached is a copy of the International Preliminary Examination Report.

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# APPLICANTS FOR PURPOSES OF U.S. NATIONAL FILING (INVENTORS)

6. The applicants (inventors) for purposes of U.S. national filing are:

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SAMPSON, John Roger

## DECLARATION OR OATH

7. No original declaration or oath was filed. The executed original declaration or oath for this application is attached hereto.

## PRELIMINARY AMENDMENT

8. A Preliminary Amendment in accordance with 37 C.F.R. § 1.121 is attached. The attached Amendment cancels claims 1-8 inclusively and adds new claims 9-23. The filing fees should be calculated based upon the claims set forth in the Preliminary Amendment. Following entry of the Amendment, there are 3 independent claims and 15 total claims pending in the Application.

## CALCULATION OF FILING FEES

9. Fees for Claims

Each independent claim in excess of 3	\$ 78.00	x	0 =	\$ 0.00
Each claim in excess of 20	\$ 18.00	x	0 =	\$ 0.00
Multiple dependent claim(s)	\$260.00	x	0 =	<u>\$ 0.00</u>
<b>Total fees for claims</b>				<b>\$ 0.00</b>

10. Fees for Extension of Time

The proceedings herein are for a patent application. The provisions of 37 C.F.R. § 1.136(a) apply. Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time. Please charge any extension fees to Deposit Account 10-1213.

11. **Basic Completion Fee**

- ( X ) Search report has been prepared by the EPO or JPO \$ 840.00 \$ 840.00
- ( ) Neither international preliminary examination fee  
nor international search fee paid to USPTO \$ 970.00

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12. Total Fee Due

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**TOTAL FEE DUE**

**\$ 840.00**

**PAYMENT OF FEES**

13. Enclosed is a check in the amount of \$ 840.00 as payment of required fees.  
Please charge any additional fees which may be required, or refund any overpayment, to Deposit Account No. 10-1213.

**ASSIGNMENT**

14. An Assignment of the Application and an Assignment Recordation Cover Sheet are attached. Enclosed is a check in the amount of \$40 as payment for the assignment recordation fee.

**INFORMATION DISCLOSURE STATEMENT**

15. An Information Disclosure Statement in accordance with 37 CFR 1.97 and 1.98 is attached.

**POWER OF ATTORNEY**

16. The undersigned practitioner and firm have authority to act in this case. An executed Power of Attorney specifically giving the undersigned authority to act in this case is included with the attached Combined Declaration and Power of Attorney.

Date:

July 24, 2000

Colin D. Barnitz  
SIGNATURE OF PRACTITIONER

Colin D. Barnitz  
Reg. No. 35061

**Send all correspondence to:**

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of  
SAMPSON, John Roger

**U.S. Pat. Appl. No.: TBA**  
Filed : July 24, 2000

U.S. National Stage of PCT/GB99/00260

For : SMOKING ARTICLES

Attorney Docket No. SAMP-US1

Group Art Unit: TBA

Examiner: TBA

**PRELIMINARY AMENDMENT UNDER 37 CFR § 1.121**

Honorable Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

This Preliminary Amendment amends International PCT Application No. PCT/GB99/00260 filed January 26, 1999, and which is being entered into the National Stage in the U.S. in accordance with 35 U.S.C. § 371 by the attached documents. This Preliminary Amendment is intended to put the International Application into proper form for examination in the U.S. Patent Office. Accordingly, please amend the International Application, prior to the calculation of the filing fee, as follows:

**IN THE SPECIFICATION:**

**Page 1, line 2, please add the heading:**

-- BACKGROUND OF THE INVENTION --

**Page 3, after line 8, but before line 9, please add the heading:**

-- SUMMARY OF THE INVENTION --

Page 4, after line 12, but before line 13, please add the heading:

-- DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS --

Page 11, line 1, please delete the heading "CLAIMS" and please add the heading:

-- WHAT IS CLAIMED: --

**IN THE CLAIMS:**

Please delete claims 1-8 in their entirety, prior to calculation of the filing fee, and please add new claims 9-23, as follows:

9. A smoking article comprising:

a tobacco rod which comprises a blend of shredded tobacco and shredded reconstituted tobacco sheet, the reconstituted tobacco sheet containing activated carbon particles;  
and

a wrapper around the tobacco rod, the wrapper having a permeability of 20 CORESTA or greater.

10. An article according to claim 9 in which the activated carbon particles are of vegetable origin.

11. An article according to claim 10 wherein the vegetable origin is coconut.

12. An article according to claim 9 wherein the carbon particles have a mean particle size of about 37  $\mu\text{m}$ .

13. An article according to claim 10 wherein the carbon particles have a mean particle size of about 37  $\mu\text{m}$ .

14. An article according to claim 11 wherein the carbon particles have a mean particle size of about 37  $\mu\text{m}$ .

15. An article according to claim 9 wherein the shredded reconstituted tobacco sheet contains sufficient activated carbon particles to reduce the aldehyde content of mainstream smoke when the smoking article is smoked.

16. A method of producing a smoking article with reduced sidestream smoke and increased perceived mildness during smoking, said method comprising:

providing as a tobacco rod substance a blend of shredded tobacco and shredded reconstituted tobacco sheet containing activated carbon particles; and

placing about the tobacco rod substance a wrapper of a material having a permeability of 20 CORESTA or greater.

17. A method according to claim 16 wherein the step of placing of the wrapper about the tobacco rod substance includes the step of hand-rolling the smoking article.

18. A method according to claim 16 wherein said step of providing a blend of shredded tobacco and shredded reconstituted tobacco sheet containing activated carbon particles includes the step of providing sufficient activated carbon particles so as to reduce the aldehyde content of mainstream smoke when the smoking article is smoked.

19. A method according to claim 17 wherein said step of providing a blend of shredded tobacco and shredded reconstituted tobacco sheet containing activated carbon particles includes the step of providing sufficient activated carbon particles so as to reduce the aldehyde content of mainstream smoke when the smoking article is smoked.

20. A kit for hand-rolling a smoking article with reduced sidestream smoke and increased perceived mildness during smoking, said kit comprising:

a tobacco rod substance of shredded tobacco and shredded reconstituted tobacco sheet containing activated carbon particles; and

a wrapper material having a permeability of 20 CORESTA or greater.

21. The kit of claim 20 wherein the shredded reconstituted tobacco sheet contains sufficient activated carbon particles to reduce the aldehyde content of mainstream smoke when the smoking article is smoked.

22. The kit of claim 20 wherein the activated carbon particles are of vegetable origin.

23. The kit of claim 21 wherein the activated carbon particles are of vegetable origin.

**REMARKS**

The specification of the subject application has been amended to add appropriate headings. The original claims 1-8 have been canceled, and new claims 9-23, in accordance with U.S. practice, have been added. There are now 3 independent claims and 15 total claims pending in the application. Entry of the new claims prior to examination and prior to calculation of the filing fee is respectfully requested.

Respectfully submitted,

John Roger SAMPSON  
Applicant

JONES, TULLAR & COOPER, P.C.  
Attorneys for Applicant

Date: July 24, 2000

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SMOKING ARTICLES

This invention relates to smoking articles such as cigarettes, cigars and cigarillos, and is concerned with the reduction of sidestream smoke from smoking articles. Sidestream smoke is that which is produced when the article is alight but not being drawn on by the smoker. Mainstream smoke is that which is generated when the smoking article is drawn on by the smoker; the chemistries of mainstream and sidestream smokes are different.

Sidestream smoke is perceived to be annoying to non-smokers, especially when a cigarette is left lying as for example in an ashtray, and any reduction in it is desirable. The modification of mainstream smoke affects the perception of the article by the smoker.

The present invention uses activated carbon to modify the smoke of a smoking article. Of course, activated carbon has been used in smoking articles, and for various purposes, virtually ever since its excellent adsorbent properties became known.

For example, the effects of various carbon contents of filters have been investigated by Williams et al in a report presented to the 5th General Assembly

of CORESTA, Vienna, October 1964 and reprinted in  
Beiträge zur Tabakforschung, Vol. 3 part 3, pages 233-  
242. This showed varying adsorbence of different  
constituents of mainstream smoke by filter shreds of  
different make-up. However we are concerned with  
placing of carbon in the tobacco rod; that is, where it  
is subjected to conditions very different from those in  
a filter.

GB-A-1512352 shows the use of activated porous  
particles of carbon adhered to tobacco in the tobacco  
rod to affect mainstream smoke. GB-A-1348580 shows a  
sheet of reconstituted tobacco material containing  
activated carbon used as a main material for making  
cigarettes which gave a reduction in particulates and  
nicotine in mainstream smoke.

As far as we are aware at present the only  
disclosure of the use of carbon in a tobacco rod in a  
situation where reduction of sidestream smoke was aimed  
for is in US-A-5092353 (EP-A-378774). However the aim  
in that disclosure was to reduce sidestream smoke by  
the use of wrapping paper of very low permeability (<  
10 CORESTA units). To compensate for the tendency this  
will cause for the cigarette to be self-extinguishing,  
pyrolyzed alpha-cellulose was present in the tobacco

rod.

This pyrolyzed material was not subjected to any activating treatment. No mention is made of any chemical effect it might have on the smoke, and it probably has little or none because in the specific example the pyrolyzed material was cotton linters, which would give a comparatively low surface-area carbon.

The present invention, therefore, is contrasted with all of this prior art by providing in a tobacco rod an activated carbon for having an effect on the chemistry of smoke while not being limited to the use of low permeability papers, and specifically not to papers of < 10 CORESTA.

Furthermore, the present invention provides the addition of activated carbon in specific particulate form in reconstituted tobacco sheet to the tobacco rod of the smoking article in such a way that greater mildness of the smoking article is perceived by the smoker in the mainstream smoke, and at the same time there is a reduction in sidestream smoke over a wide range of porosities of the wrapper of the article and in particular with porosities high enough that special precautions do not have to be taken to prevent self-

extinction of the article.

Furthermore, the activated carbon particle should preferably be of vegetable origin since they will then contain minute traces of metals, which assist in the firm adsorption of (particularly) aldehydes from the smoke and indeed may chelate with such compounds. These are compounds the removal of which is particularly critical for improving mildness of perception of the article when smoked.

At the same time, however, the activated carbon does not diminish and may even increase certain beneficial volatile components of the smoke.

It is important to realise that as the "coal" of the smoking article progresses along the article, smoke components adsorbed by the particles are displaced from those particles minimally if at all. They are destroyed to gaseous oxides together with the material of the carbon particle itself by the extremely high temperatures (reaching up to about 800°C) generated in the coal.

The reconstituted tobacco sheet containing the activated carbon particles may be made by conventional techniques for making such sheets, which in their turn resemble conventional paper-making techniques, the

sheet then being shredded for incorporation with shredded tobacco which will be the material of the tobacco rod.

An important application of the present invention however will be in "roll your own" tobacco blends, i.e. those which are sold loose and which are wrapped in cigarette papers by the smoker.

The invention therefore includes within its scope a blend of shredded tobacco and of reconstituted tobacco sheet with the latter containing activated carbon.

The handling of the sheet, whether in shredding or in later manipulation either in a machine or by the smoker, may cause loss of carbon particles and the reconstituted tobacco sheet may be coated or sized in order to assist retention of the particles in it, and in particular the particles may themselves be micro-encapsulated before incorporation. This latter has the advantage of increasing the size of the particles and therefore their retention mechanically and the uniformity of size but, perhaps surprisingly, does not affect their activity.

#### Example 1

Cigarettes were made from a mixture of US flue-

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cured and Burley tobaccos, cut rolled stem and expanded tobaccos, processed and cut to 32 cuts per inch ("cpi"). Incorporated in the shredded tobacco were 20% of a reconstituted tobacco sheet equally cut and containing 30% of activated carbon particles from coconut, of mean particle size 37  $\mu\text{m}$  and ranging in particle size from 0.5  $\mu\text{m}$  to 150  $\mu\text{m}$ . Control cigarettes were made identically but with the omission of the activated carbon particles.

The cigarettes were 84 mm long, 7.9 mm diameter, unfiltered. The wrapping was an 80 CORESTA flax-based paper, with 2% potassium citrate burn enhancer.

The cigarettes were subjected to smoking on a standard smoking machine and the mainstream smoke was analysed for vapour phase and semi-volatiles content with the results shown in Tables 1 and 2.

As seen in Table 1, there was a striking diminution, selective in character, of certain aldehydes and ketones and in particular of acrolein and butyraldehydes, the removal of which is important for mildness of taste. On the other hand, there was an actual increase as compared to the standard in certain ingredients, and in particular limonene, which are

regarded as beneficial to the taste.

X       A similar reduction though less selective is  
seen in the semi-volatiles as shown in Table 2.

Example 2

5       Cigarettes and controls were prepared using the  
same tobacco blend and reconstituted tobacco sheet as  
in Example 1, but using respectively papers of 25, 50,  
80 and 180 CORESTA units porosity. Sidestream smoke  
from the inventive cigarettes and from the controls had  
10       significant reductions both in semi-volatiles and in  
nicotine content, as seen in Table 3. Increased carbon  
monoxide and carbon dioxide production is assumed to be  
due to the presence of the particulate carbon in the  
tobacco sheet.

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TABLE 1

## VAPOUR PHASE ANALYSIS, RESULTS SUMMARY

(Non-ISO 4387 conditions)

Component	Relative Peak Area				Test as % of Control
	Control		Test		
	Mean	RSD	Mean	RSD	
Isoprene	30.8	3	30.6	4	100
Limonene	2.3	33	2.6	17	114
Benzene	16.9	5	16.5	3	97
Toluene	26.7	9	27.3	4	102
Ethylbenzene	4.1	18	4.5	8	108
m-+p-Xylene	6.0	19	6.7	8	112
o-Xylene	1.4	21	1.6	9	112
Styrene	1.5	28	1.7	14	112
Acetaldehyde	9.4	4	9.3	3	98
Propionaldehyde	2.6	7	2.5	7	97
Acrolein	3.5	4	3.2	5	92
n-Butyraldehyde	0.48	5	0.44	4	91
iso-Butyraldehyde	1.3	4	1.2	4	91
Crotonaldehyde	2.6	9	2.5	6	98
2-Furaldehyde	1.5	37	1.8	20	114
Acetone	110.2	4	99.0	4	90
Methylethylketone	29.5	5	26.8	4	91
3-Methyl-2-butanone	1.6	7	1.5	5	95
Diacetyl	55.1	5	50.2	3	91
2-Pentanone	0.27	6	0.25	4	94
2,3-Pentanedione	3.3	9	3.2	5	95
Cyclopentanone	2.2	18	2.2	18	101
Furan	5.7	3	5.4	4	95
2-Methylfuran	3.9	4	3.9	3	99
2,5-Dimethylfuran	6.3	6	6.4	3	101
Acetonitrile	12.9	6	12.6	5	98
Propionitrile	2.5	7	2.5	4	98
n-Butyronitrile	2.5	8	2.5	12	102
iso-Butyronitrile	1.1	7	1.1	5	96
Methacrylonitrile	0.79	4	0.80	5	102
Pyridine	1.3	43	1.5	20	115
1-Methylpyrrole	1.4	12	1.5	6	107
Methylsulphide	0.62	8	0.56	8	91
Thiophene	0.19	6	0.19	4	98
Replicates	12		11		

Highlighted values are statistically significantly different at a 95% confidence limit (Student-t Test, two-tail)

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**TABLE 2**  
**SEMIVOLATILES ANALYSIS, RESULTS SUMMARY**

	$\mu\text{g/CIGARETTE}$				Test as % of Control
Component	Control		Test		
	Mean	RSD	Mean	RSD	
Limonene	21.9	13	20.8	10	95
Naphthalene	2.0	3	1.9	5	95
1-Methylnaphthalene	1.1	3	1.1	5	99
2-Methylnaphthalene	1.6	6	1.6	4	99
Neophytadiene	127.2	7	108.8	3	85
Myosmine	9.3	4	10.1	3	109
Pyrrrole	11.3	6	9.6	6	85
2-Acetylpyrrole	3.9	5	3.6	4	92
Indole	9.8	3	9.0	4	91
2-Furaldehyde	51.1	5	41.8	5	82
2-Acetylfuran	8.6	9	7.2	4	83
2-Furanmethanol	43.4	7	37.2	7	86
5-Methyl-2-furfural	25.9	9	22.6	6	87
5-Hydroxymethyl-2-furfural	118.7	3	105.4	4	89
$\alpha$ -Angelicalactone	23.0	7	19.4	13	84
Phenol	79.5	4	71.9	4	90
o-Cresol	17.3	4	14.9	3	86
p-Cresol	27.5	4	24.6	4	89
m-Cresol	12.0	3	10.5	4	88
2,3,6-Trimethylphenol	0.6	15	0.5	6	84
Pyridine	13.0	14	13.2	7	102
Triacetin	n/d		n/d		
TEGDA	n/d		n/d		
Propan-1,2-diol	126.6	69	85.3	43	67
Puffs/cig:	9.0	2	8.9	1	98
TPM (mg/cig):	17.9	3	15.5	3	87
Replicates	12		12		

n/d - not detected

Detection limits: Triacetin and TEGDA 1 $\mu\text{g/cigarette}$ 

Highlighted values are statistically significantly different at a 95% confidence limit  
 (Student-t Test, two-tail)

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TABLE 3

Sidestream measurements

	SAMPLE	NFDPM (mg/cig)	% REDUCTION	NICOTINE (mg/cig)	% REDUCTION	CO (mg/cig)	CO <sub>2</sub> (mg/cig)
25 CORESTA	CONTROL	30.1	-	7.00	-	76.3	634
	TEST	25.5	15.3	5.74	18.0	80.5	626
50 CORESTA	CONTROL	32.5	-	6.55	-	70.6	612
	TEST	28.4	12.6	6.07	7.3	76.1	682
80 CORESTA	CONTROL	29.1	-	7.09	-	81.9	629
	TEST	27.5	5.5	6.21	12.4	74.1	672
180 CORESTA	CONTROL	33.9	-	7.03	-	77.6	630
	TEST	27.5	18.9	6.07	13.7	73.6	653

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CLAIMS

1. A smoking article having a tobacco rod which comprises blend of shredded tobacco and shredded reconstituted tobacco sheet, the reconstituted tobacco sheet containing activated carbon particles, and a wrapper around the tobacco rod, the wrapper having a permeability of 20 CORESTA or greater.
2. An article according to claim 1 in which the activated carbon particles are of vegetable origin.
3. An article according to claim 2 wherein the vegetable origin is coconut.
4. An article according to claim 1, claim 2 or claim 3 wherein the carbon particles have a mean particle size of about  $37\mu\text{m}$ .
5. A method of producing a smoking article with reduced sidestream smoke and increased perceived mildness during smoking which includes using for the tobacco rod of the article shredded tobacco and shredded reconstituted tobacco sheet containing activated carbon particles, and as the wrapper of the smoking article a material having a permeability of 20 CORESTA or greater.
6. A method according to claim 5 including hand-rolling the smoking article.

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7. A method according to claim 5 or claim 6 which involves preferential reduction in the aldehyde content of mainstream smoke.

8. A kit for hand-rolling a smoking article with
- 5 reduced sidestream smoke and increased perceived mildness during smoking which includes for the tobacco rod of the article shredded tobacco and shredded reconstituted tobacco sheet containing activated carbon particles, and as the wrapper of the smoking
- 10 article a material having a permeability of 20 CORESTA or greater.

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**COMBINED DECLARATION AND POWER OF ATTORNEY**

As a below named inventor, I hereby declare that:

This declaration is of the following type:

- ☐ original
- ☐ design
- ☐ supplemental
- ☒ national stage of PCT
- ☐ divisional
- ☐ continuation
- ☐ continuation-in-part (CIP)

My residence, post office address, and citizenship are as stated next to my name.

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed for and for which a patent is sought on the invention entitled:

Smoking articles

the specification of which:

- ☐ is attached hereto
- ☐ was filed on \_\_\_\_\_, as  
Application Serial No. \_\_\_\_\_  
and was amended on \_\_\_\_\_  
(if applicable)
- ☒ was described and claimed in PCT International application  
No. PCT/GB 99/00260 filed on 26 December 1999  
and as amended under PCT Article 34 on  
(if any).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any Amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

[ ] In compliance with this duty there is attached an information disclosure statement in accordance with 37 CFR 1.97.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) or 365 (b), of any foreign application(s) for patent or inventor's certificate, or 365(a) or any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or any PCT international application having a filing date before that of the application on which priority is claimed:

[ ] no such applications have been filed

[X] such applications have been filed as follows:

Prior Foreign Application(s)

<u>9801797.3</u>	<u>GB</u>	<u>28/01/1998</u>	Priority claimed: [ X ] [ ]
(Number)	(Country)	(day/month/year filed)	Yes No
<u>                    </u>	<u>                    </u>	<u>                    </u>	Priority claimed: [ ] [ ]
(Number)	(Country)	(day/month/year filed)	Yes No

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below:

<u>                                    </u>	<u>                                    </u>
(Application Number)	(Filing Date)
<u>                                    </u>	<u>                                    </u>
(Application Number)	(Filing Date)

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose all information known to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

<u>                                    </u>	<u>                                    </u>	<u>                                    </u>
(Application Serial No.)	(Filing Date)	(patented, pending, abandoned)
<u>                                    </u>	<u>                                    </u>	<u>                                    </u>
(Application Serial No.)	(Filing Date)	(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(patented, pending, abandoned)

**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorney(s) and/or agents of JONES, TULLAR & COOPER, P.C. to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

George M. Cooper, Reg. No. 20,201

Felix J. D'Ambrosio, Reg. No. 25,721

James W. Hellwege, Reg. No. 28,808

Colin D. Barnitz, Reg. No. 35,061

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Douglas R. Hanscom, Reg. No. 26,600

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⑦

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I hereby declare all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under ' 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor: John Roger SAMPSON

Inventor's signature: [Signature]

(Date) 15/6/2000

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